

CLAIMS:

1. A peptide comprising an amino acid sequence substantially homologous to the amino acid sequence of a fragment of a pyrogenic exotoxin, and derivatives of said peptide, capable of eliciting protective immunity against toxic shock induced by a pyrogenic exotoxin or by a mixture of pyrogenic exotoxins.
2. A peptide comprising an amino acid sequence substantially homologous to the amino acid sequence of a fragment of a pyrogenic exotoxin, and derivatives of said peptide capable of antagonizing toxin-mediated activation of T cells.
3. A peptide comprising an amino acid sequence substantially homologous to the amino acid sequence of a fragment of a pyrogenic exotoxin, and derivatives of said peptide, capable of protecting against toxic shock induced by a pyrogenic exotoxin or by a mixture of pyrogenic exotoxins.
4. A peptide according to claim 1 or claim 2 or claim 3, wherein said pyrogenic exotoxin is a bacterial exotoxin.
5. A peptide according to claim 4 wherein said exotoxin is produced by *Staphylococcus aureus* or *Streptococcus pyogenes*.
6. A peptide according to claim 5 comprising an amino acid sequence substantially homologous to the amino acid sequence of a fragment of *Staphylococcal aureus* enterotoxin B (SEB).
7. A peptide according to claim 6 comprising the amino acid sequence shown in SEQ ID NO:1 and derivatives thereof, capable of eliciting protective immunity against toxic shock induced by at least one pyrogenic exotoxin and/or of antagonizing toxin-mediated activation of T cells.
8. A peptide according to claim 7 having the amino acid sequence shown in SEQ ID NO:1 and derivatives thereof, capable of eliciting protective immunity

against toxic shock induced by at least one pyrogenic exotoxin and/or of antagonizing toxin-mediated activation of T cells.

9. A peptide according to claim 6 comprising the amino acid sequence shown in SEQ ID NO:2 and derivatives thereof, capable of eliciting protective immunity against toxic shock induced by at least one pyrogenic exotoxin and/or of antagonizing toxin-mediated activation of T cells.
10. A peptide according to claim 9 having the amino acid sequence shown in SEQ ID NO:2 and derivatives thereof, capable of eliciting protective immunity against toxic shock induced by at least one pyrogenic exotoxin and/or of antagonizing toxin-mediated activation of T cells.
11. A peptide according to claim 6 comprising the amino acid sequence shown in SEQ ID NO:3 and derivatives thereof, capable of eliciting protective immunity against toxic shock induced by at least one pyrogenic exotoxin and/or of antagonizing toxin-mediated activation of T cells.
12. A peptide according to claim 11 having the amino acid sequence shown in SEQ ID NO:3 and derivatives thereof, capable of eliciting protective immunity against toxic shock induced by at least one pyrogenic exotoxin and/or of antagonizing toxin-mediated activation of T cells.
13. A peptide according to claim 6 comprising the amino acid sequence shown in SEQ ID NO:4 and derivatives thereof, capable of eliciting protective immunity against toxic shock induced by at least one pyrogenic exotoxin and/or of antagonizing toxin-mediated activation of T cells.
14. A peptide according to claim 13 having the amino acid sequence shown in SEQ ID NO:4 and derivatives thereof, capable of eliciting protective immunity against toxic shock induced by at least one pyrogenic exotoxin and/or of antagonizing toxin-mediated activation of T cells.

15. A peptide according to claim 1, wherein said fragment may be further linked through its N-terminus to a lauryl-cysteine (LC) residue and/or through its C-terminus to a cysteine (C) residue, or to other residue/s suitable for linking said peptide to adjuvant/s for immunization.
16. A peptide according to claim 15 having the amino acid sequence shown in SEQ ID NO:5 and derivatives thereof, capable of eliciting protective immunity against toxic shock induced by a pyrogenic exotoxin or by a mixture of pyrogenic exotoxins and/or of antagonizing toxin-mediated activation of T cells.
17. A peptide according to claim 15 having the amino acid sequence shown in SEQ ID NO:6 and derivatives thereof capable of eliciting protective immunity against toxic shock induced by a pyrogenic exotoxin or by a mixture of pyrogenic exotoxins and/or of antagonizing toxin-mediated activation of T cells.
18. A peptide according to claim 1, in the form of a dimer, a multimer or in a constrained conformation.
19. A peptide according to claim 18, having the amino acid sequence shown in SEQ ID NO:7 and derivatives thereof, capable of eliciting protective immunity against toxic shock induced by a pyrogenic exotoxin or by a mixture of pyrogenic exotoxins and/or of antagonizing toxin-mediated activation of T cells.
20. A peptide according to claim 18 having the amino acid sequence shown in SEQ ID NO:8 and derivatives thereof, capable of eliciting protective immunity against toxic shock induced by a pyrogenic exotoxin or by a mixture of pyrogenic exotoxins and/or of antagonizing toxin-mediated activation of T cells.

21. A peptide according to claim 18 which is conformationally constrained by internal bridges, short-range cyclizations, extension or other chemical modification.
22. A peptide according to claim 21 having the amino acid sequence shown in SEQ ID NO:9 and derivatives thereof, capable of eliciting protective immunity against toxic shock induced by a pyrogenic exotoxin or by a mixture of pyrogenic exotoxins and/or of antagonizing toxin-mediated activation of T cells.
23. A peptide according to claim 21 extended at the N-terminus and/or C-terminus thereof with amino acid residue/s identical to those in the corresponding position/s of said pyrogenic exotoxin or with different amino acid residue/s, which may be naturally occurring or synthetic amino acid residue/s.
24. A peptide according to claim 23 having the amino acid sequence shown in SEQ ID NO:10 and derivatives thereof, capable of eliciting protective immunity against toxic shock induced by a pyrogenic exotoxin or by a mixture of pyrogenic exotoxins and/or of antagonizing toxin-mediated activation of T cells.
25. A peptide according to claim 23 comprising the amino acid sequence shown in SEQ ID NO:11 and derivatives thereof, capable of eliciting protective immunity against toxic shock induced by a pyrogenic exotoxin or by a mixture of pyrogenic exotoxins and/or of antagonizing toxin-mediated activation of T cells.
26. A peptide according to claim 1, capable of inhibiting expression of pyrogenic toxin-induced mRNA encoded by the IL-2, IFN- γ or TNF- β genes.
27. A peptide according to claim 1, capable of eliciting the production of antibodies that block T-cell activation.

28. A pharmaceutical composition for the treatment or prophylaxis of toxin-mediated activation of T cells, comprising as active ingredient a therapeutically effective amount of at least one peptide or derivative thereof according to claim 2.
29. A pharmaceutical composition for protecting against toxic shock induced by a pyrogenic exotoxin or a mixture of pyrogenic exotoxins, comprising as active ingredient a therapeutically effective amount of at least one peptide or derivative thereof according to claim 3.
30. A vaccine for conferring immunity against toxic shock induced by a pyrogenic exotoxin or by a mixture of pyrogenic exotoxins comprising as active ingredient an immunologically effective amount of at least one peptide or derivative thereof according to claim 1.
31. A vaccine according to claim 30 further comprising a suitable immunization adjuvant selected from proteosomes, KLH or alum or combinations thereof.
32. A vaccine according to claim 29 wherein said immunizing adjuvant is a combination of proteosomes and alum or is a combination of KLH and alum.
33. A vaccine according to claim 32 for enhancing production of antibodies that block T cell activation.
34. A method for treating harmful effects and toxic shock induced by at least one pyrogenic exotoxin comprising administering to a patient in need of such treatment a therapeutically effective amount of a composition according to claim 28.
35. A method according to claim 34 wherein said harmful effect is food poisoning.
36. A method for treating harmful effects and toxic shock induced by at least one pyrogenic exotoxin comprising administering to a patient in need of such

treatment a therapeutically effective amount of at least one peptide according to claim 2.

37. A method according to claim 36 for treating food poisoning induced by a pyrogenic exotoxin.
38. A method for preventing harmful effects, toxic shock and death induced by a pyrogenic exotoxin or by a mixture of pyrogenic exotoxins comprising administering to a patient in need of such treatment a therapeutically effective amount of a composition according to claim 27 or a therapeutically effective amount of at least one peptide according to claim 2 or claim 3.
39. A method for conferring immunity to toxic shock induced by a pyrogenic exotoxin or by a mixture of pyrogenic exotoxins, comprising administering to a patient an effective immunizing amount of a vaccine according to claim 30 or of at least one peptide according to claim 1.
40. Use of a peptide according to claim 1 in the preparation of a vaccine according to claim 30, or of a peptide according to claim 2 in the preparation of a pharmaceutical composition according to claim 27.
41. Antibodies directed against a peptide according to claim 27 which block T-cell activation.
42. An antiserum containing antibodies directed against a peptide according to claim 26, which peptide is capable of eliciting the production of said antibodies, preferably in the presence of a suitable immunization adjuvant.
43. An antiserum according to claim 42 wherein said suitable immunizing adjuvant is proteosome, KLH or alum or combinations thereof.
44. An antiserum according to claim 43 wherein said immunizing adjuvant is a combination of proteosomes and alum or is a combination of KLH and alum.

45. An antiserum according to claim 42 which is a domestic animal antiserum.
46. An antiserum according to claim 42 capable of alleviating harmful effects and toxic shock induced by a pyrogenic exotoxin or by a mixture of pyrogenic exotoxins.
47. A method for assessing the efficacy of a vaccine for conferring immunity against one or more pyrogenic toxins comprising determining the ability of serum from an immunized individual to antagonize toxin-mediated activation of T cells.
48. A method according to claim 47 wherein the ability of serum from an immunized individual to antagonize toxin-mediated activation of T cells is determined by measuring the inhibition of expression of pyrogenic toxin-induced mRNA encoded by the IL-2, IFN- γ or TNF- β genes.
49. A kit for assessing the efficacy of a vaccine for conferring immunity against one or more pyrogenic toxins comprising determining the ability of serum from an immunized individual to antagonize toxin-mediated activation of T cells by the method of claim 47.

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